Guide to Air Sealing

Air sealing is one of the most cost-effective ways to improve the comfort and energy efficiency of your home. Hire a certified professional contractor for best results.

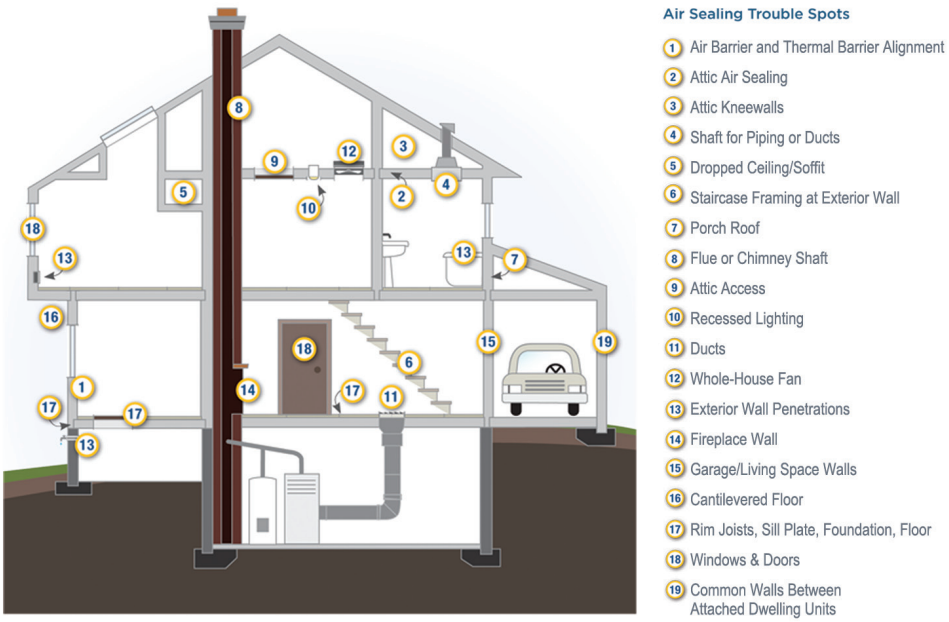
Why Air Sealing?

Most homeowners know that proper insulation helps keep a house warm in summer and cool in winter. Insulation works by blocking the flow of heat through a surface such as a wall or roof. But insulation does not necessarily block the movement of air. This is especially true when there are cracks, holes, or other gaps that can be found in a typical house. Think of insulation as a sweater — it can keep you warm when the air outside is cold, but it does not really block the wind. For that you need a windbreaker. Air sealing acts like a windbreaker.

Air leaks can make your home feel drafty and uncomfortable and place an unnecessary strain on heating and cooling equipment, which decreases their efficiency and raises your energy bills. Air leaks can also let in moisture that can warp and damage wood and lead to mold.

Air Leak Locations

Air leaks can occur anywhere in the home where gaps exist. Those around windows and doors are the most obvious, but there are often many smaller and less detectable ones. Other places to find air leaks are where rising warm air is replaced by cooler air (as often happens between an attic and the conditioned spaces below) or where exposed insulation contains dirty spots (showing air infiltration). Air leaks also often occur where brick and wood siding or foundations and walls meet. At least 19 key areas (shown in the illustration above) have been identified where air sealing can improve a home's energy efficiency, comfort, and building durability.



Source: "Retrofit Techniques & Technologies: Air Sealing-A Guide for Contractors to Share with Homeowners." Vol. 10, Building America Best Practices Series, Prepared by Pacific Northwest National Laboratory & Oak Ridge National Laboratory for the U.S. Department of Energy (April 12, 2010).

This illustration shows the 19 key areas where air sealing can improve a home's energy efficiency, comfort, and building durability. The information in this guide can help you find a certified home performance contractor and work with your contractor to identify problem areas, prioritize projects with safety in mind and start sealing the air leaks in your home for cost-effective energy savings.

Finding and Sealing Air Leaks in an Existing Home

It is best to hire a professional energy auditor who will first carry out a home energy assessment in order to find air leaks, determine the best course of action for sealing those leaks, and carry out the upgrade work. Many homeowners, however, elect to use a do-it-yourself approach to finding and sealing air leaks. This approach can be effective for obvious leaks such as around door frames

Pair it with Ventilation

Before air sealing, it is essential first to determine how much fresh air is needed to ensure healthy indoor air quality and to properly ventilate combustion appliances such as stoves, ovens, fuel-burning furnaces, and fireplaces. Without proper ventilation, excessive water vapor and harmful combustible gases can accumulate in the home. If combustion appliances do not get enough oxygen, they will operate inefficiently and may release dangerous gases such as carbon monoxide into the home. Ensuring that you have proper ventilation is yet another reason you should hire a professional home energy auditor or certified HVAC (heating, ventilating, and air conditioning) contractor. Please see the DOE Guide to Ventilation for more information on ventilating a house.

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and exterior wall penetrations for pipes, vents, electrical fixtures and wires, and around ducts and fans. However, this approach will not work for small and hard to detect leaks, especially those in attics of existing homes that may be covered by layers of insulation.

Use a Certified Professional Contractor

A certified home energy auditor is trained to assess the efficiency and durability of a home. Such individuals evaluate the patterns of energy usage in a home and employ techniques such as the blower door test and thermal (infrared) camera imaging to locate the sources of air leaks. They also can determine how well a house is ventilated to avoid the buildup of damaging water vapor or harmful gases.

There are two nationally recognized certifications for home energy auditors and contractors: the Building Performance Institute (BPI) Building Analyst certification and the Residential Energy Services Network (RESNET) Home Energy Rating System (HERS) Rater certification. The easiest and most effective way to find a certified contractor is through the Home Performance with ENERGY STAR® program that promotes a comprehensive, whole-house approach to energy-efficient improvements. Please see the *DOE Guide to Home Energy Assessments* under *Further Reading* for more information.

Upon completion of the assessment you will receive a report detailing the most energy-efficient measures and cost-effective options available for installing air sealing measures. A certified contractor will help you deal with any safety or health issues that may arise before undertaking any energy-efficient upgrades, as well as local building codes that must be met.

Doing It Yourself

If you are going to undertake a do-it-yourself approach to air sealing those readily accessible parts of your home where there are obvious air leaks, you have a number of materials available to you. They include:

- Caulk, including acrylic latex and high temperature-resistant silicone caulk (for sealing around flues, vents and pipes associated with chimneys, furnaces, and water heaters; however, it is recommended that you go to a professional contractor for such air sealing needs);
- Spray foam, including expandable polyurethane (which may also be used for insulation) and water-based foams;
- Weather-stripping (such as around doors and between window frames and sashes), including tension seal, felt, reinforced foam, rubber tape, aluminum or stainless steel door sweeps, metal gaskets, bulb or fin seals, and other types of interlocking metal channels.

Further Reading

DOE Energy Savers: Insulation and Air Sealing
www.energysavers.gov/insulation_airsealing

Building Performance Institute
www.bpi.org

DOE Guide to Home Energy Assessments
www.energysavers.gov/publications

DOE Guide to Ventilation
www.energysavers.gov/publications

Home Performance with ENERGY STAR Locations
www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_hpwes_partners

RESNET – HERS Rater
www.resnet.us/trade/home-energy-raters-hers-raters

Financial Incentives

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